CLAIMS

1. A method for controlling the mains bridge of a four-quadrant PWM frequency converter provided with a DC intermediate circuit when the power is flowing in the direction towards the supply network,

said frequency converter being provided with an AC inductor (9) to be connected to an alternating voltage source (U_U, U_V, U_W), a controlled mains bridge (10), a DC intermediate circuit (14) and a controlled load bridge (11) for feeding a variable-frequency alternating voltage (U_S, U_R, U_T) into a load (12), and said mains bridge being provided with controlled semiconductor switches (V1-V6) and shunt diodes (D1-D6), and

wherein the mains bridge (10) is mainly controlled in such manner that the controlled semiconductor switch in the upper branch of the phase having the highest supply voltage instantaneous value and the controlled semiconductor switch in the lower branch of the phase having the lowest supply voltage instantaneous value are conducting,

characterized in that the control of the mains bridge semiconductor switch to be conducting next is advanced by a time sufficient to cause the current of the conducting phase to turn from negative to positive before commutation.

2. A method according to claim 1 in a frequency converter in which the mains bridge semiconductor switches are gate turn-off components, such as IGBTs,

characterized in that the control of the switch to be conducting next is advanced by at least a time step T1, where

$$T1 = \frac{1}{2f} \times \{1 - \frac{1}{\pi} \times [\cos^{-1}(\frac{\sqrt{2} \times \pi \times f \times L \times i_{DC}}{U} - 1]\}$$

3. A method according to claim 1 in a frequency converter in which the semiconductor switches in the mains bridge are thyristors having a recovery time of (t_Q),

characterized in that the control of the thyristor to be conducting next is advanced by at least a time step T2 + 0.5* t_Q, where

$$T2 = \frac{1}{2f} \times \{1 - f \times t_Q - \frac{1}{\pi} \times \cos^{-1}[\frac{\sqrt{2} \times \pi \times f \times L \times i_{DC}}{U} + \cos(\pi \times (1 - f \times t_Q))]\}.$$

4. A four-quadrant PWM frequency converter having a mains bridge, said mains bridge being controllable by means of a control unit (13) in such manner that power flows in the direction towards the supply network,

said frequency converter being provided with an AC inductor (9) to be connected to an alternating voltage source (U_U, U_V, U_W), a controlled mains bridge (10), a DC intermediate circuit (14) and a controlled load bridge (11) for feeding a variable-frequency alternating voltage (U_S, U_R, U_T) into a load (12), and said mains bridge being provided with controlled semiconductor switches (V1-V6) and shunt diodes (D1-D6), and

wherein the mains bridge (10) is mainly controlled in such manner that the controlled semiconductor switch in the upper branch of the phase having the highest supply voltage instantaneous value and the controlled semiconductor switch in the lower branch of the phase having the lowest supply voltage instantaneous value are conducting,

characterized in that the control unit advances the control of the semiconductor switch to be conducting next by a time sufficient to cause the current of the conducting phase to turn from negative to positive just before commutation.

5. A frequency converter according to claim 4, in which the mains bridge semiconductor switches are gate turn-off components, such as IGBTs,

characterized in that the control unit advances the control of the mains bridge semiconductor switch to be conducting next by at least time T1, where

$$T1 = \frac{1}{2f} \times \{1 - \frac{1}{\pi} \times [\cos^{-1}(\frac{\sqrt{2} \times \pi \times f \times L \times i_{DC}}{U} - 1]\}$$

6. A frequency converter according to claim 4, in which the mains bridge semiconductor switches are thyristors having a recovery time (t_Q),

characterized in that the control unit advances the control of the thyristor to be conducting next by at least time T2 + 0.5* t_Q, where

$$T2 = \frac{1}{2f} \times \{1 - f \times t_Q - \frac{1}{\pi} \times \cos^{-1}[\frac{\sqrt{2} \times \pi \times f \times L \times i_{DC}}{U} + \cos(\pi \times (1 - f \times t_Q))]\}.$$